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Building Better Pastures

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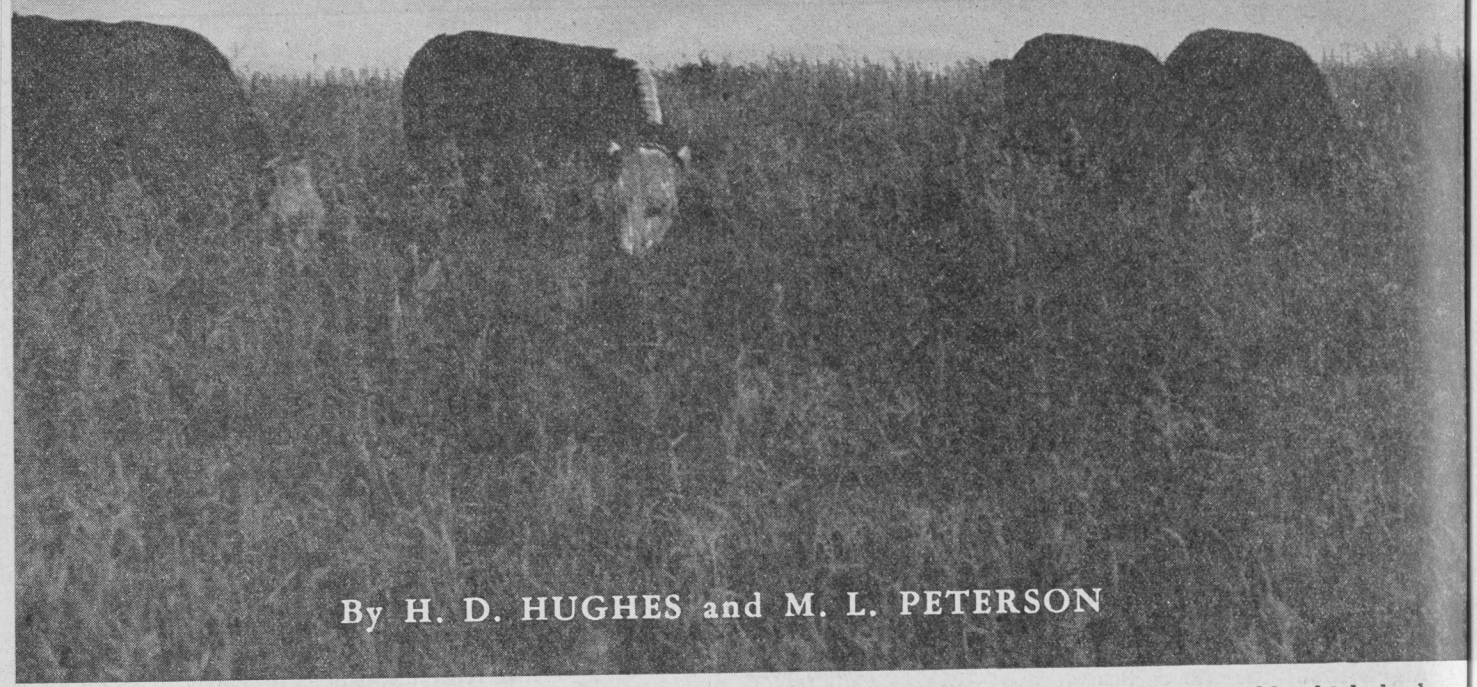


By H. D. HUGHES and M. L. PETERSON

This highly productive bromegrass-alfalfa pasture was once a badly eroded, abandoned field which had grown up to mixture of redtop, bluegrass and weeds. It was converted directly to bromegrass and alfalfa without growing an intertilled crop in making the change-over. This is desirable where erosion is serious.

PASTURES AND HAY lands were plowed up during the war to make room for more corn and soybeans.

On many farms it's time to get land back into clover and grass, to meet the needs for pasture and hay and to help build up depleted soils.

On many farms it is a matter of making the land now in pasture carry more livestock than it has been.

What should we be planning now to get better pastures in the season ahead?

Renovating Bluegrass

Much of our land in bluegrass pasture has become relatively unproductive, with weedy sods. Continuous close grazing, starved grass roots, depleted fertility and an acid condition are largely responsible for the low returns obtained from such pasture land.

The results obtained by the Iowa Station through a period of years from bluegrass renovation studies at Mt. Pleasant, Iowa, and later at Albia, are fairly well known.

The term "renovated bluegrass" has come to mean introducing clover into the grass by disking or other cultivation, with the use of lime and phosphate if the soil needs them. This procedure feeds the grass roots and results in a thick, heavy sod. The vigorous grass growth largely eliminates weeds. The growth of clover provides succulent, nutritious, palatable pasturage in midsummer when bluegrass usually becomes dormant, hard and unpalatable. Usually a good renovation job greatly increases the productivity and carrying capacity of the pastures. There are few communities in which the practicability of renovating bluegrass pastures has not been demonstrated.

The essentials of a successful renovation job seem to include the following:

1. If possible lime in the fall before spring seeding if the soil is acid. Then you can get a good stand and vigorous growth of sweetclover or alfalfa. These legumes are excellent in pasture renovation seedings.

2. Disk or tear up the grass some other way in the fall if possible. The lime can then become active immediately, and it reduces the seedbed work in the spring.

3. Apply 200 to 300 pounds of 20 percent superphosphate (or its equivalent) in the spring and work in well when fitting the seedbed.

4. Do a thorough job of tearing up the grass sod when fitting the seedbed. Don't worry about hurting the grass, for it will come back quickly and better than ever.

5. Seed in the early spring or not at all—not later than April 15

and as much earlier as possible.

6. Seed a mixture of adapted legumes. The mixture most widely used in Iowa consists of 5 pounds of sweetclover, 3 of red clover and 2 of alsike per acre, with 10 pounds of lespedeza also included for extreme southern Iowa counties.

Lime Helps Pastures

At the Pasture Improvement Farm in southern Iowa, near Albia, we used a series of six experimental pastures several years to compare the production of untreated native bluegrass pastures with that obtained from the same land when renovated, both with and without lime. The seeding mixture we used was that already referred to as in general use. The pastures were grazed with native steers. The pounds of beef gained per acre for the various treatments for the seasons 1941 through 1943 are shown in table 1.

Considering both tillage and seed costs it is quite obvious that under these soil conditions reseeding without the use of lime is not effective. Such increase in production as we obtained on pastures reseeded without lime was due largely to the acid-tolerant Korean lespedeza, with some help from red clover. But where we included lime, both the stand and growth of all legumes were much better. Renovation, including reseeding and use of lime, increased the average number of pounds of beef produced per acre from 108 to 193, an increase of approximately 80 percent.

Phosphate Aids Legumes

Many farmers know that the growth of legumes usually is greatly stimulated with phosphate fertilizers.

One of the most striking observations on the experimental pastures at Mt. Pleasant was the much thicker and more vigorous growth of the sweetclover on the pasture which received 150 pounds per acre of 20 percent superphosphate in addition to lime, as contrasted with the pasture limed but not phosphated.

Beginning with the 1944 season, we modified the bluegrass renovation experiment at Albia to include phosphorus with lime. The sod was torn up with a weighted spring-tooth harrow in the fall of '43, thoroughly disked in the spring of '44 and 250 pounds of 20 percent superphosphate applied to two of the four limed pastures.

The phosphate was thoroughly mixed with the soil during the disking operation in the early spring. Two other pastures were handled in identically the same manner except that no phosphate fertilizer was used. The seeding mixture was the same as for the preceding years. Native steers were turned into all pastures in mid-May and remained on them until about the middle of October, both in 1944 and 1945. The results, in pounds of beef per acre, are shown in table 2.

In all previous renovated pasture seedings within our experience satisfactory gains in production have been obtained in the seeding season. Such was not the case in 1944, though it will be observed that for the 1945 season, when the legumes were in their second year, good increases from the phosphate resulted. The effect of the phosphate fertilizer was evident in 1944 in the markedly thicker stand and more vigorous growth of the clovers.

The failure to obtain benefit from the phosphate in '44 can be attributed only to the accidental inclusion on these pastures of animals which did not gain satisfactorily. Individual steers show great differences in gains under the same pasture conditions. For this reason experiments of this kind must be continued several years before reliable results can be obtained.

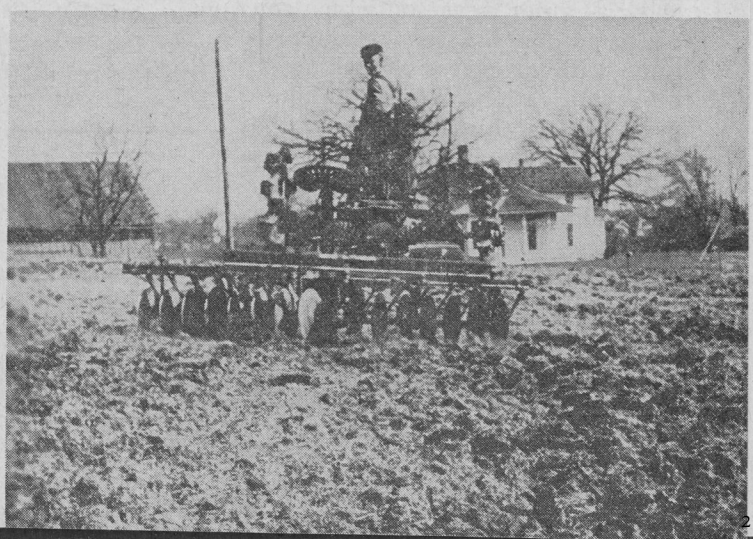
Manage the Grazing

You can benefit from pasture renovation for several years only if you manage the grazing properly. A common fault is to graze so heavily in the second season following renovation that the biennial clovers fail to reseed. Reseeding is essential to success and can only be accomplished through controlled grazing during those weeks when seed heads are forming.

After the seed is developed then graze heavily for the remainder of the season and even into the fall,

Many pastures of southern and eastern Iowa need to be limed in the fall before they are reseeded in the spring in order to establish good stands of legumes. Where the land is steep one may have to spread with a team and wagon as these men are.

A common sharp disk, heavily weighted, will do a satisfactory job of preparing a seedbed for legumes in thin bluegrass pastures. A spring-tooth harrow, field cultivator or a plow works more satisfactorily in sod that is too heavy for a disk to tear it up well.



Biennial clovers may be maintained in bluegrass pastures only if allowed to reseed. This renovated pasture was grazed lightly during late May and early June to permit reseeding, after which it was heavily grazed to remove top growth and bring shattered seed in contact with the soil.

so that all the accumulated growth of grass and clover is gone from the surface by winter. This close grazing permits the legume seed to be shattered and brought in close contact with the soil. It also weakens the grass so that its competition with the seedling legumes the following spring will be reduced. This is desirable.

Solve Renovation Problems

Some farmers have had difficulty in maintaining good stands of clovers in bluegrass pastures through a period of years. Experienced and observing livestock men are overcoming this difficulty through good grazing management. We have seen renovated pastures in various parts of Iowa which showed good stands of sweetclover in the grass 6 and 7 years after seeding.

Pastures which have been closely grazed the season through show a rather weak sod which can be fitted for the renovation program without excessive disking or other cultivation. When the bluegrass sod is thick and heavy the cost of preparing the seedbed has been excessive. The disk has been used almost altogether in Iowa in pasture renovation, not because this is the best tool but because it is the only available tool which has been thought suitable.

Some Iowa farmers know that several implements are better for renovation than the disk. Shallow plowing to set back the grass and give the clover seedings a chance to become established is preferred in some areas. Plowing also helps control weeds. Tractor-mounted corn cultivators and subsurface tillers also have given excellent results.

We compared four methods of seedbed preparation at Albia in 1945. These included (1) disking, (2) plowing shallow in the fall, (3) plowing shallow in the spring and (4) tilling with a rigid, mounted, subsurface tiller, especially constructed for the purpose. The sod was very heavy and dense.

The fall-plowed plots were plowed about 4 inches deep in mid-November (1944), while the spring plowing was done the last of March at about the same depth. The plots which were fall-plowed were left rough over the winter with the result that there was little or no erosion. The plowed plots were disked twice with the tandem disk just before seeding on March 28. The sub-tilled plot was disked twice in the spring with tandem disk and the disked plot four times.

The degree to which bluegrass was set back or killed varied greatly between the different treatments. The grass was almost entirely killed on the fall-plowed plots. The average stand of clover obtained on these plots was estimated at 96 percent. Considerable bluegrass came back on the plots spring-plowed. The average stand of clover seedings was 78 percent on these plots. Kentucky bluegrass came back very strong and vigorous, both on the disked plots and on those sub-tilled and disked. Clover stands on these plots averaged 65 and 59 percent, respectively.

Seeding mixtures compared on

Table 1. Acre production in pounds of beef on untreated pastures and pastures reseeded with and without lime.

Treatment	Pounds gained per acre			
	1941	1942	1943	Average
Untreated	99	98	126	108
Reseeded, without liming	138	136	156	143
Limed and reseeded	195	184	200	193

Table 2. Acre production in pounds of beef from (1) untreated pastures; (2) reseeded pastures which were limed; and (3) reseeded pastures limed and phosphated.

	Treatment	Pounds gained per acre			Average daily gain		
		1944	1945	Average	1944	1945	Average
(1)	Untreated	98	112	105	1.16	1.45	1.31
(2)	Limed and reseeded	143	150	147	1.29	1.25	1.27
(3)	Limed, phosphated and reseeded	107	203	155	.98	1.61	1.30

each of the plots receiving the different tillage treatments included (1) a mixture of 5 pounds of sweetclover, 3 of red clover and 2 of alsike; (2) Ladino clover 4 pounds per acre; (3) birdsfoot trefoil 6 pounds per acre; and (4) bromegrass 8 and alfalfa 10 pounds per acre.

The clover mixture produced the heaviest growth in the first, or seeding, year. The Ladino clover also made a very heavy, vigorous growth, particularly late in the season. The birdsfoot trefoil, as is characteristic of this legume, made very little growth the first year, particularly on the plots where the bluegrass had not been sufficiently killed back. We expect this legume will do well the second year.

The bromegrass-alfalfa combination made an exceptionally good growth on the plots which had been plowed in the fall so that the bluegrass was largely killed out. The conversion of bluegrass pasture to a bromegrass-alfalfa pasture appears to be a relatively simple job. Changing bluegrass pasture into a bromegrass-legume pasture would seem to be a desirable step and entirely feasible on many farms.

Conversion Feasible

It will be simpler and the labor and power costs will be less, in many cases, to prepare a seedbed from bluegrass sod by shallow plowing than by disking. The plowing job can be done in the late fall at a time when other farm operations are not particularly pressing, whereas the disking procedure must be carried out in the spring in a crowded interval. Little soil loss may be expected from shallow plowed bluegrass sod if it's plowed on the contour and left rough over the winter. Oats will be seeded in the spring with the clover, all to be grazed. On long slopes, where the possibility of erosion may offer a problem, sod buffer strips at intervals are desirable. Any small areas particularly subject to erosion can be left unplowed.

Bromegrass yields much more feed in pasture than Kentucky bluegrass. For a long-time pasture either grass should be grown with a legume. The production of the two grasses, each grown without a legume, is shown in table 3.

The average yield of the five varieties of bromegrass was 63 percent greater than that of Kentucky bluegrass. When it becomes hot and dry, Kentucky bluegrass stops growing, dries up and is unpalatable in the midsummer months.

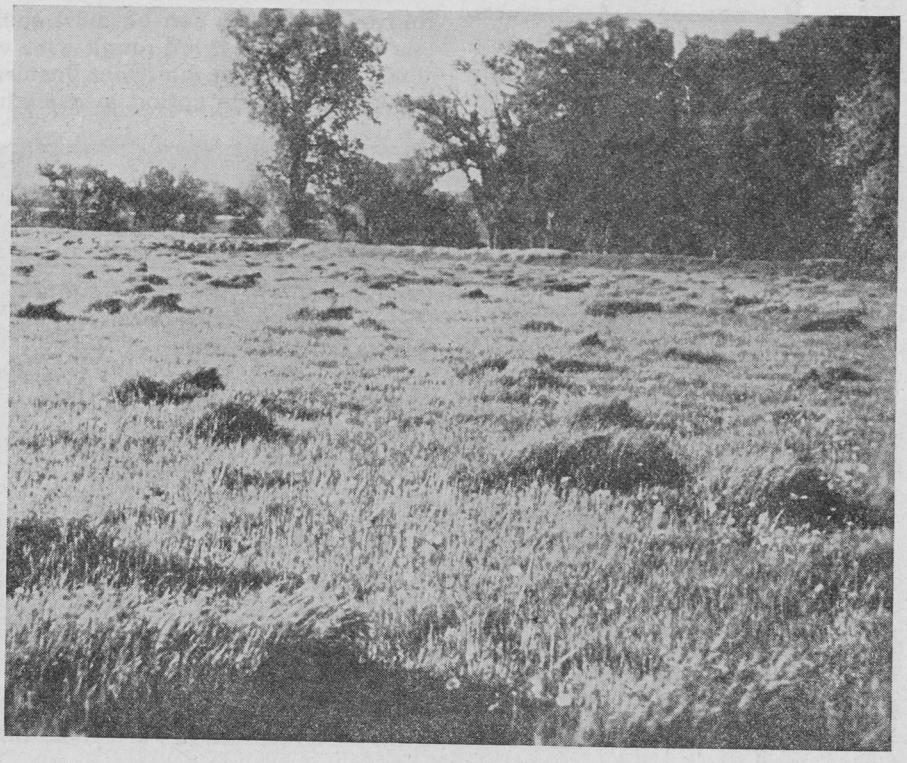
Long Rotation Pastures

Undoubtedly many pastures in Iowa which are left permanently in bluegrass would be helped by cultivation, where this can be done without erosion. Such pastures can be plowed and put into corn for 1 year, after which the field would be seeded down to bromegrass-alfalfa with oats as a nurse crop. Such a seeding should remain productive for several years, but after it becomes sodbound it can again be plowed and another crop of corn produced while reestablishing the brome-alfalfa. The grass portions of such fields which cannot or should not be plowed are allowed to grow up during the year and are grazed off in the early winter after the corn has been harvested.

Mow the Pasture

Some pastures, because of their steepness or because of trees,

Bluegrass pastures generally suffer greatly from a lack of nitrogen. The pasture below shows excessive growth in spots due to nitrogen deposits from urine of cattle. Legumes introduced into the grass supply needed nitrogen and help maintain production during the hot summer months.



rocks or ditches, cannot be plowed and must be left permanently in bluegrass. Often such pastures are badly infested with weeds and buckbrush and produce little feed. In every case these pastures can be made more productive by mowing to control the weeds and buckbrush, which rob the soil and grass of needed moisture and nutrients.

Mow Brush, Weeds

Perennial weeds can best be controlled by mowing when in the bud stage, which usually is early July. Pastures with perennial weeds need to be mowed several seasons to eliminate them. Annual weeds, such as ragweed, are easily controlled by mowing before they have made seed. The best time to mow such weeds is about August 1.

Buckbrush has become a serious problem on many southern and western Iowa pastures. This shrub can be controlled by mowing once each summer. The most difficult job is removing the first heavy growth. The growth in succeeding years then can easily be mowed with an ordinary horse-drawn mower. Surprisingly heavy brush can be mowed by the tractor mower with power take-off, operating the tractor in low gear with considerable speed on the sickle.

Annual mowing of pastures should become a general practice because it so greatly improves the production.

Table 3. The yield of five strains of Kentucky bluegrass and five varieties of bromegrass, 1943 through 1945, inclusive.

Bluegrass strain	Tons per acre green hay 3-year av.	Bromegrass variety	Tons per acre green hay 3-year av.
K1—Kentucky selection	2.83	Fischer	4.41
K3—Denmark 2330	2.96	Lincoln	4.81
K4—Swedish selection	2.84	Achenbach	4.99
Commercial	2.37	Commercial	3.96
Iowa selection	2.45	Iowa brome	3.77
Average	2.69	Average	4.39

New, Better Pasture Crops

The list of new and improved varieties of forage crops is increasing. The superior southern types of bromegrass, Fischer, Lincoln and Achenbach, are already finding a permanent place on many Iowa farms. The Ranger and Buffalo varieties of alfalfa, with their high resistance to bacterial wilt, undoubtedly will have an important bearing on the use of this crop in seeding with bromegrass for hay and pasture.

Other new forage varieties are just around the corner. These include such varieties as L6 and L39 lespedeza, Madrid sweetclover, Emerson red clover, Ioreed canarygrass, Ladino clover and birdsfoot trefoil, all of which are giving very promising results in pasture seedings.

Vitamin C in Apples

Some study has been made of the vitamin C content of apples at the Iowa Station. Vitamin C is the vitamin sought in oranges and tomatoes.

Ten varieties of apples were tested for vitamin C content and one of these was found to be much richer than the rest. That variety was Willow Twig. The vitamin C content of Willow Twig not only was high at ripening but it stayed up well through storage.

Work at other stations indicates that apple varieties differ considerably in vitamin C content. As a result of this research, new varieties probably will be bred that are high in vitamin C.

An apple like the Willow Twig furnishes about as much vitamin C as an equal quantity of tomato.

Heavy grass sods can be most easily renovated by plowing on the contour in the fall. If left rough over winter there's a little danger from erosion. This field at the Albia Pasture Farm was plowed in late November for seeding in the spring to a mixture of adapted grasses and legumes.